

CHALLENGES AND OPPORTUNITIES FOR SOURCE WATER PROTECTION
PLAN IMPLEMENTATION IN SASKATCHEWAN:
LESSONS FOR CAPACITY BUILDING

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ABSTRACT

Source water protection (SWP) is defined as a land use management and planning process aimed at the protection of surface and groundwater sources from contamination. Currently in Saskatchewan, the Water Security Agency is leading much of the planning and management with the goal of safe drinking water sources and reliable water supplies. The Water Security Agency has developed SWP planning initiatives across the southern portion of the province. Rates of SWP plan implementation in Saskatchewan are uneven and dependent on multiple factors. Using document review and key informant interviews, this study identifies factors facilitating and constraining source water protection plan implementation in selected areas and describes capacity building needs for SWP plans implementation in Saskatchewan. Results are discussed based on four capacity areas: financial, institutional, technical and social capacity. The results in this study show that capacity areas in need of improvement include stable financial resources, training opportunities for local watershed groups, public awareness, adequate stakeholder involvement, SWP plan re-evaluation, and information/data access. The result of this research contributes to the understanding of SWP plan implementation relating to capacity building needs at the watershed scale in the prairie region.

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TABLE OF CONTENTS

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ABSTRACT

ACKNOWLEDGEMENTS

1.0 INTRODUCTION	1
1.1 <i>Research goals and objectives</i>	3
1.2 <i>Organization of chapters</i>	4
2.0 LITERATURE REVIEW	
2.1 <i>Source Water Protection (SWP)</i>	5
2.2 <i>Implementation</i>	7
2.3 <i>Capacity</i>	11
2.3.1 <i>Financial capacity</i>	12
2.3.2 <i>Institutional capacity</i>	13
2.3.3 <i>Technical capacity</i>	14
2.3.4 <i>Social capacity</i>	14
2.4 <i>Summary</i>	15
3.0 RESEARCH METHODS	
3.1 <i>Document Review</i>	16
3.2 <i>Interview</i>	17
3.3 <i>Planning and watershed context</i>	20
3.3.1 <i>Moose Jaw River watershed</i>	23
3.3.2 <i>Assiniboine River watershed/Yorkton region</i>	23
3.3.3 <i>South Saskatchewan River watershed</i>	24
3.3.4 <i>Upper Souris River watershed</i>	25
3.4 <i>Summary</i>	26
4.0 RESULTS	
4.1 <i>Local Watershed Groups & Source Water Protection Plans</i>	28
4.1.1 <i>Moose Jaw River SWP Plan & Stewards</i>	29
4.1.2 <i>Assiniboine River SWP Plan & Association</i>	32

4.1.3 Yorkton Area Aquifer SWP Plan	35
4.1.4 South Saskatchewan River SWP Plan & Stewards	37
4.1.5 Upper Souris River SWP Plan & Association	40
4.2 Provincial organizations	43
4.2.1 Leading agency	43
4.2.2 Other government agencies	45
4.2.3 Non-government organizations	46
4.3 Summary	48
5.0 DISCUSSION	
5.1 Financial capacity	50
5.2 Institutional capacity	52
5.3 Technical capacity	54
5.4 Social capacity	56
5.5 Connections among capacity factors.....	57
5.6 Summary	59
6.0 CONCLUSION	
6.1 Research significance	60
6.2 Research contribution	65
6.3 Limitations and future research	66
7.0 REFERENCES	67
8.0 APPENDIX A	
Interview Questions	73
FIGURES	
Figure 1: Watershed Study Areas Map	22
Figure 2: Implementation Stage Model	63

CHAPTER 1

INTRODUCTION

Protecting the quality of drinking water resources in Canada has become a priority due to several recent water-borne contamination events. Drinking water contamination resulted in 7 deaths and more than 2300 illnesses in Walkerton, ON, in 2000. One year later a second water contamination event in North Battleford, Saskatchewan, caused many serious illnesses but fortunately no deaths. As of September 2013, approximately 1200 boil water advisories have been issued for community drinking water systems across Canada (The Water Chronicles, 2013). A healthy and sustainable water resource is a critical issue for all communities in Canada. In order to maintain a safe water supply, five components of a multi-barrier approach have been promoted in Canada (CCME, 2002). These five components are: source water protection, drinking water treatment, distribution system monitoring, water quality monitoring, and an emergency response program. Municipalities, or local water management agencies, have traditionally focused on water treatment and the water distribution system. After the events of Walkerton and North Battleford communities began to give greater attention to the first barrier approach, source water protection.

Source water protection (SWP) involves a land use management and planning process in order to prevent contamination of source water, either surface water or groundwater. SWP identifies possible pathway of contamination in drinking water sources (Goss and Richards, 2008). Bender (2005) suggests that SWP can be as simple as using a fence to

keep cattle away from a drinking water source. A clean water source requires less water treatment; even minor protection in source water could result in significant cost benefits (Timmer et al, 2007).

Across Canada, provincial governments have enacted a mix of regulations and policies to guide source water protection planning. The Government of Saskatchewan is responsible for safe drinking water following the Walkerton incident, creating the Safe Drinking Water Strategy. The goal for this strategy is to protect the water resource, to supply safe, clean, and sustainable drinking water, to improve water treatment plants, and to develop an effective water regulation system (SWA, 2002). A number of provincial and local groups and organizations are directly involved in protecting water resource, including the Water Security Agency (WSA), the Ministry of Agriculture, the Saskatchewan Association of Watersheds (SAW), local watershed groups or associations, and many other stakeholders. As part of Saskatchewan's Safe Drinking Water Strategy, the Water Security Agency (WSA) has been leading source water protection planning with the goal to ensure access to safe drinking water sources and reliable water supplies (WSA, 2010). The WSA has developed detailed planning initiatives across the southern portion of the province. These initiatives include the administration and control of infrastructure, inventory maintenance of quality and quantity of ground and surface water, undertaking watershed studies and research, evaluations of the condition of watershed resources in the province, and developing and implementing watershed protection plans through government cooperation and local community consultation (WSA, 2010). Furthermore, source water protection plans in Saskatchewan were developed cooperatively by watershed advisory committees

that include representatives from urban and rural municipalities, First Nations, industry, environmental and agricultural interest organizations. The SWP plan implementation process involves partnerships and plan implementation staff at the WSA provides technical assistance and support to local organizations by helping with projects and events, supporting Technical Advisory Committees, assisting with efforts to contact land managers, providing direction regarding beneficial management practices, and contributing technical writing for funding applications (SWA. 2008).

Ten SWP plans in Saskatchewan have been adopted since 2006. Some key actions in these SWP plans have been implemented, others have not. The challenge of plan implementation is exacerbated by the fact that watershed groups have different capacity needs for SWP. Some research has been done in Ontario and Nova Scotia to identify the local capacity needs to protect drinking water source. Little research has been conducted on capacity needs for source water protection plan implementation in Saskatchewan, and this fact has motivated this research.

1.1 Goal and objectives

This research aims to identify capacity building needs that would facilitate the implementation of source water protection plans in Saskatchewan. To achieve this goal, the following objectives are identified:

- 1) To identify facilitating and constraining factors for the implementation of existing source water protection plans;

- 2) To describe capacity building needs for plan implementation;
- 3) To derive lessons learned for capacity building for source water protection plan implementation in Saskatchewan.

1.2 Organization of chapters

Following this introductory chapter, chapter 2 presents the literature reviewed for this research. Chapter 3 covers the methodology used to gather data for this research. Chapter 4 reports the results of this research. The research findings are discussed in chapter 5. Recommendations and limitations are summarized in chapter 6. References cited and appendices follow these chapters.

CHAPTER 2

LITERATURE REVIEW

Source Water Protection (SWP) aims to protect drinking water and is necessary to help to reduce the risk of water contamination. In order to better understand the research question and context, this section will provide background literature on SWP and plan implementation. This literature review will cover the following topics: SWP background, plan implementation, and capacity building.

2.1 Source Water Protection

The drinking water supply system can be broken down into three parts: the source water, the drinking water treatment system, and the distribution system which carries the treated water to homes, businesses, schools, and other buildings (WSA, 2002). Ivey et al (2006) stated that “source waters are the lakes, rivers, and aquifers from which raw drinking water is drawn”. The definition of SWP is land and water planning for the protection of drinking water source (Patrick, 2009). SWP aims to improve drinking water quality, reduce the risk of water borne contamination, and protect future water sources (Patrick, 2011; Ivey et al, 2006). Protecting the water source is “vital importance for the supply of domestic water and has led to comprehensive planning and environmental regulations aimed at reducing the threat to the water resource from land use activities” (Vejre et al, 2010).

SWP plans can be developed on a watershed-scale or on a municipal-scale (Water Policy and Governance Group, 2010). Patrick (2008) stated that source water protection is easier, cheaper and safer to protect a drinking water source from contamination than it is to remediate after contamination. Research indicates that implementing source water protection costs 6 to 20 times less than remediating and treating contaminated water supplies (Minnesota Water Sustainability Framework, 2011; Timmer et al, 2007; Patrick, 2011).

According to Ivey et al (2006), a successful source water protection plan includes “close attention to social, political, technical, financial and institutional capacity related factors”. SWP is a comprehensive activity; it is a planning program with multiple components operating at the watershed level (Patrick, 2008). Typical elements of source water protection involve “a water assessment, water quality monitoring, vulnerability or threats assessment delineation of sensitive water protection areas, plan implementation to protect water quality and public education” (National Research Council, 2000). Timmer et al (2007) states that “protecting source water supplies includes clear government leadership, appropriate institutional arrangements which are both at the local and provincial level, adequate financial resources, supportive community members, and technical skills and educational staff”. Particularly, SWP is challenged by political/provincial boundaries that cut across watersheds. Land use and watershed planning activities in one region may affect water quality of another region or a downstream water management. Therefore, without social and political support, SWP is difficult to achieve. SWP plans allow responsible parties to develop and implement contextually appropriate protection measures. These

plans include “the delineation of a source water protection area surrounding a public water supply, the identification of vulnerabilities and assessment of threats within the area, and the development of measures to address the identified vulnerabilities and threats” (Water Policy and Governance Group, 2010). Easy access to knowledge such as financial, technical, and human resources, social and political commitment could be helpful for a region capacity to protect its drinking water resources, and integrate land and water management objectives (Ivey et al, 2006).

2.2 Plan Implementation

A planning cycle consists of a number of stages: “assessing resources, setting management objectives, assessing trade-offs, and evaluating and monitoring plan implementation” (Jackson et al, 2012). Rogers (2003) states the classic implementation model is that implementation is only one of five crucial stages in the wide-scale diffusion of innovations:

- (1) dissemination (conveying information about the existence of an innovation to potentially interested parties), (2) adoption (an explicit decision by a local unit or organization to try the innovation), (3) implementation (executing the innovation effectively when it is put in place), (4) evaluation (assessing how well the innovation achieved its intended goals), and (5) institutionalization (the unit incorporates the innovation into its continuing practices)

Meyers et al (2012) also states “as implementation often involves studying innovations in

real world contexts, individual or multiple case studies have been the primary vehicle for learning about factors that affect the implementation process, yet the methodological rigor and generalizability of these reports varies”.

Successful factors for environmental plan implementation include: “continual improvement culture; community focus; accountability; camaraderie; customer service mentality; transparency; competitiveness; proactive and involved leaders; competent workforce; empowerment of workforce; and appreciation of successes” (Summerill et al, 2010). Ananda & Proctor (2013) states that:

Sufficient access to all dimensions of capacity is vital to the successful development and implementation of a water allocation plan by a community group working collaboratively. Financial resources and technical information are pivotal to carry out the task effectively. Facilitating more opportunities to build networks and gain a better understanding of major catchment issues, policy and technical aspects of water planning and the capacity building in the community and provide pathways to future collaboration possibilities.

Involving communities in identifying problems and solutions is critical for building legitimacy and capacity needed to implement a plan effectively (Fischer, 2000). Moreover, local experts and a steering committee may help to identify local groundwater conditions and issue (Taylor et al, 2009). There is also a need to develop effective training and technical assistance for plan implementation process (Meyers et al, 2012).

Several countries have engaged in implementation of water management plans, for

example, Turkey presents some requirements for environmental plan implementation. The environmental management action plan should involve targets, strategies, financial program for short, medium, and long terms. Also, there are technical and financial assistant in the Turkey Environmental Strategy project within the framework of capacity building in order to manage the water resource and to enable the implementation of the EU Water Acquis (accumulated legislation) (Moroglu & Yazgan, 2008). In Denmark, the designation of groundwater protection areas entails the formulation of action plans and mapping of the areas, including “land use, delineation of well head areas and catchments areas, assessments of pollution sources, identification of vulnerable areas and areas where action is required” (Thomsen et al. 2004). In the USA, approximately 90 percent of rural residents consume their water from groundwater. After recognizing the needs to protect sources of drinking water, the Safe Drinking Water Act (SDWA) was launched in 1996 to authorize the establishment of the Source Water Assessment and Protection Program (SWAP) (Kelly, 2005).

Meyers et al (2012) report the important relationship is between support and delivery systems for implementation. To delivery quality implementation, the support system should develop, build, and strengthen the important capacities for the effective implementation. In other words, the support system aims to “build and help maintain an adequate level of capacity in the delivery system, and the delivery system utilizes its capacities to put the innovation into practice so that outcomes are likely to be achieved” (Meyers et al, 2012). In the practice of water protection, stewardship involves “actions taken by individuals to protect the quality and quantity of their groundwater supplies.

Promoting the development of such plans would also benefit attempts to incorporate private stewardship efforts into municipal source water protection initiatives” (Kreutzwiser et al, 2011). Meyers et al (2012) also report that the implementation document has to meet two main criteria: (1) contain a framework of the main actions and strategies for an effective implementation process, and (2) contain a timeline and priority.

Barriers and constraints exist with the implementation process. Coastal Protection and Restoration Authority in Louisiana US (2007) reported that “. . . in order to engage the implementation process, materials and other resources are limited and will restrict how quickly plans can be completed. Constraining implementation factors included poor communication; inflexibility; complacency; lack of awareness, interest or reward; and coercion from senior staff” (Summerill et al, 2010). Also, concerns about lack of government funding and the lack of appropriate resources would come up to a negative effect on water quality management in the City of Hamilton, ON Canada. Jones et al (2007) states: “the cutbacks would probably limit the effectiveness of, and prevent possible advances in, the municipal water system and therefore increasing the risk of waterborne disease”. Taylor et al (2009) states a problem for plan implementation that the scale mismatching when the boundaries of management do not coincide with the boundaries of a given ecosystem.

In Canada, environment and natural resource management is the responsibility of the provincial and federal governments (Reed, 2007). Since there is no federal legislation for source water protection, provincial and municipal institutional regulations are responsible

for protecting environmental and natural resource (Ivey et al, 2006; Reed, 2007). Patrick (2009) also stated that source water protection is largely a regulatory program, requiring provincial government policy commitments. Timmer et al (2007) found that municipalities are usually responsible for land and watershed planning, but the provincial government controls all types of those activities. Also, Patrick (2009) reported that there is a problem of communication between provincial and local watershed management decision making. Furthermore, municipal boundaries can be considered particularly challenging in source water protection (Ivey et al, 2006). Timmer et al (2007) also suggests that “provincial agencies and local organizations require adequate resources such as funding, training, technical supports, public consultation and authority from institutional arrangements for effective implementation of SWP plans”. All those factors would be related to capacity building needs and will be explained in next section.

2.3 Capacity

The concept of “capacity” is linked to various fields, including public sector agencies and institutions, local economic development, local environmental management and public health (de Loë, 2002; Timmer et al, 2007). SWP plans are difficult to be effectively implemented at the ground level. A main contributing factor to explain the difficulty of plan implementation is related to capacity limitations at the local level (Timmer et al, 2007). Four capacity factors used in this study include financial capacity, institutional capacity, technical capacity, and social capacity. These four capacity factors were selected

from the literature as those best suited in the Saskatchewan context. Financial capacity includes financial needs of any plans. Institutional capacity includes water governance, regulations and policies. Technical capacity includes human resource and technical infrastructure. Social capacity includes public involvement and stakeholders. For the purpose of this research, the various components of capacity have been narrowed to these four capacity types. This was done for the clarity of data analysis.

2.3.1 Financial Capacity

Financial capacity is the ability to generate and access funding. The presence of adequate resources to meet operating and maintenance expenses is critical to water management at all levels (Timmer et al, 2007). De Loë (2002) also defines “financial capacity is in terms of revenue sufficiency, credit worthiness, and fiscal management and controls. Heavy reliance on grants and other sources of revenue from senior governments may impact a municipality's ability to function independently”. Decreasing in financial resources could cause a serious delay to implement programs and services. The size of a municipality's budget can be one factor which affects the level of expenses of source water protection; this will also influence several expensive technical programs (de Loë, 2002). According to de Loë (2005), the financial resources available to communities also become one important consideration. Both concerns are the quantity of money available for water protection activities and water management.

2.3.2 Institutional Capacity

Institutional capacity encompasses the governance of source water protection, including local by-laws, provincial statutes and regulations and policies and plans created by actors at local or provincial scales. An institutional environment that is conducive to SWP at different levels should provide “legal support for land use planning, land acquisition, and protective zoning” (Timmer et al, 2007). However, overlapping agency responsibilities, fragmented administrative structures, and weak or inappropriate legislation can significantly reduce an organization's capacity. De Loë (2002) states that institutional considerations which influence capacity exist at two levels. “First, a key consideration is the institutional arrangements (e.g., plans, policies, by-laws) created by municipality. Second, it is important to determine whether or not senior governments support local-level groundwater protection by providing enabling legislation, clear overall direction, and support from their agencies”. De Loë (2005) states that municipalities can create the following kinds of institutional arrangements to strengthen their groundwater protection capabilities:

- 1) land use planning instruments, such as municipal official plans, zoning ordinances or by-laws, storm water management policies, and subdivision controls; 2) source control measures, including sewer use ordinances and inspections; 3) measures designed to prevent pollution and land acquisition; 4) private land stewardship programs, including incentives, and conservation easements. The institutional arrangements for developing and managing water resources are the link between policy objectives and field-level performance. Whereas

policies provide direction as to what is to be done, institutional analysis asks who may be expected to do it, with what resources and how the institutional building blocks are expected to interact (Hamdy et al, 1998).

2.3.3 Technical Capacity

Technical capacity includes the “physical infrastructure and personnel” to operate source water protection activities (de Loë, 2002). The ability of source water protection participants to implement plans depends on “the municipal professionals and consultants to access watershed data, source water monitoring, water supply delineation and analysis of potential source water contaminants” (Timmer et al, 2007). Also, de Loë (2002) states that technical factors include six areas, these are:

Water resource definition, threat assessment, monitoring, data management, planning, and emergency response. Communities lacking staff with the appropriate technical knowledge and skills are less able to absorb and use technical information provided from external sources, whether these are government agencies, other municipalities who share data, or consultants.

2.3.4 Social Capacity

Social capacity involves three critical elements: “leadership, partnerships and

communication” (Leach, 2001). De Loë (2002) states that:

Social capacity can be measured by examining levels of community awareness and the amount and nature of community involvement, it also can be measured by the level of public awareness of source water protection issues. The level of community awareness partly is a function of a community's ability to communicate with its citizens to create awareness of ground water protection issues. The community involvement theme measures the extent to which information flows both ways or involves in decision making processes.

It is important to have support of protecting drinking water sources from government agencies, nongovernment organization, industry, commerce, landowners, and local residents (Ivey et al, 2006).

2.4 Summary

As SWP plans become adopted in Canada, there is an opportunity to begin investigating the barriers that may exist to plan implementation. In the following chapters, this research will identify capacity opportunities and limitations which are relevant to SWP plan implementation in Saskatchewan.

CHAPTER 3

RESEARCH METHODS

The goal of this research is to identify facilitating and constraining factors for SWP Plan implementation in Saskatchewan. In order to address the goal of this search, two key methods of data collection were used: first, a document review was conducted of relevant SWP plans and supporting documents in Saskatchewan; second, semi-structure interviews were conducted with key informants from selected local watershed groups. The experiences and perspectives of individuals involved with source water protection were explored through watershed or provincial-wide interviews. Two methods of data collection were chosen to bring a higher measure of validity to the research finding (Morse, 2005). Fourteen interviews were conducted in person, from November 2012 to February 2013. Documents were collected on websites before the time of the interviews.

3.1 Document Review

A broad range of documents from the Water Security Agency of Saskatchewan were reviewed including source water protection plans, yearly watershed reports, background reports and financial reports. Document review was the first step to collect information before the interview process. A review of source water protection plans provided a list of key implemented actions. Since source water refers to all ground and surface waters, selected SWP plans include a mix of surface and ground water protection plans: Surface

water protection – Upper Souris watershed SWP Plan, Moose Jaw watershed SWP Plan, Assiniboine River Watershed SWP Plan and South Saskatchewan River Watershed SWP Plan; Groundwater Protection-Yorkton aquifers SWP Plan. Moreover, watershed SWP plan yearly reports from the WSA helped to build a list of implemented and non-implemented key actions.

3.2 Interviews

Interviews with key informants are a qualitative method that is designed to answer ‘how’ and ‘why’ questions in social research. The primary goal is to generate theory based on observations, and therefore analysis of interviews provides an inductive process for theory building (Bryman, 2009). The semi-structured interview helps obtain descriptions of the experience of the interviewee in order to interpret the meaning of described phenomena (Kvale and Brinkmann, 2009). In this research, semi-structured interviews with key informants identified capacity building needs to implement source water protection plans. The semi-structured interviews were conducted between October 2012 – February 2013. The interviews were based on an interview instrument (see Appendix A). All interviewees in this research were assumed to have a level of knowledge and background with SWP and the plan implementation process.

Informants were selected to represent a cross section of local and provincial water management organizations. They were selected from a variety of backgrounds including

staff from the WSA, source water protection advisory committees, watershed coordinators, governments and non-government agencies (Table 3.1). The local watershed coordinators also had practical experience related to SWP and the plan implementation process. Interviews were conducted in Saskatoon, Regina, Estevan and Yorkton WSA offices. Same participants were interviewed for Assiniboine River SWP plan and Yorkton Area Aquifer SWP Plan because these two plans are being implemented by the Assiniboine River Watershed Stewards.

Table 3.1 Interview List

Position	Organization
Watershed Manager	Assiniboine Watershed Stewardship Association
Board Chair	Assiniboine Watershed Stewardship Association
Watershed Coordinator	Moose Jaw River Watershed Stewards Inc.
Board Chair	Moose Jaw River Watershed Stewards Inc.
Projects Manager	South Saskatchewan River Watershed Stewards Inc
Board Chair	South Saskatchewan River Watershed Stewards Inc
Watershed Coordinator	Upper Souris Watershed Association
Board Chair	Upper Souris Watershed Association
Program Coordinator	Water Security Agency
Manager, Planning Coordination	Water Security Agency
Watershed Planning Coordinator	Water Security Agency
Senior Watershed Planning Coordinator	Water Security Agency
Regional Office Manager	Ministry of Agriculture
Acting Chair	Saskatchewan Association of Watersheds

Key informants were initially contacted by emails to ask if they would participate in this research. After identifying the group of key informants, a technique called ‘snowballing’ could be applied to find other key informants by asking interview participants who they considered to be important participants for this research (Flowerdew & Martin, 2005). Several interviewees were willing to provide additional contact information for relevant staff conducting management and research of SWP in Saskatchewan. Interviews were recorded using a digital voice device, and all information was transcribed into Word document text. Transcriptions enabled an initial phase of analysis according to key words of capacity factors. A list of facilitating and constraining capacity factors was developed from the interview transcriptions.

3.3 Planning and watershed context

In 2002, the Saskatchewan Watershed Authority (now Water Security Agency) began consultation with local community members and stakeholders across the province followed by the planning process for source water protection in various watersheds (SWA, 2008). Since the WSA initiated the SWP planning process in 2003, each watershed advisory committee had already prepared the source water protection background reports and plan documents. After each watershed advisory committee completed the source water protection plan, a local watershed organization was established. Although the initiative came from the provincial government agency, local watershed groups are responsible for SWP plan implementation.

In 2006, the Moose Jaw River watershed, Lower Souris River watershed, Assiniboine River watershed, and City of Yorkton conducted their surface or ground source water protection program and started a plan implementation process. From 2007 to 2013, six source water protection plans were developed and the implementation process was started in the southern portion of Saskatchewan. The completed plans include: South Saskatchewan River watershed, North Saskatchewan River Watershed, Upper Qu'Appelle River Watershed, Upper Souris River Watershed, Swift Current Watershed, and Carrot River Watershed. There are two watersheds currently under the planning process in 2013 in Lower Qu'Appelle River Watershed and Old Wives Lake Watershed.

Five watersheds in Saskatchewan and their related source water protection plans were selected in this research based on date of adoption, size of watershed, and source of drinking water. The SWP plans selected for this study are: Moose Jaw River Watershed, Assiniboine River Watershed, Yorkton Region, South Saskatchewan River Watershed, and Upper Souris River Watershed (see Figure 1).

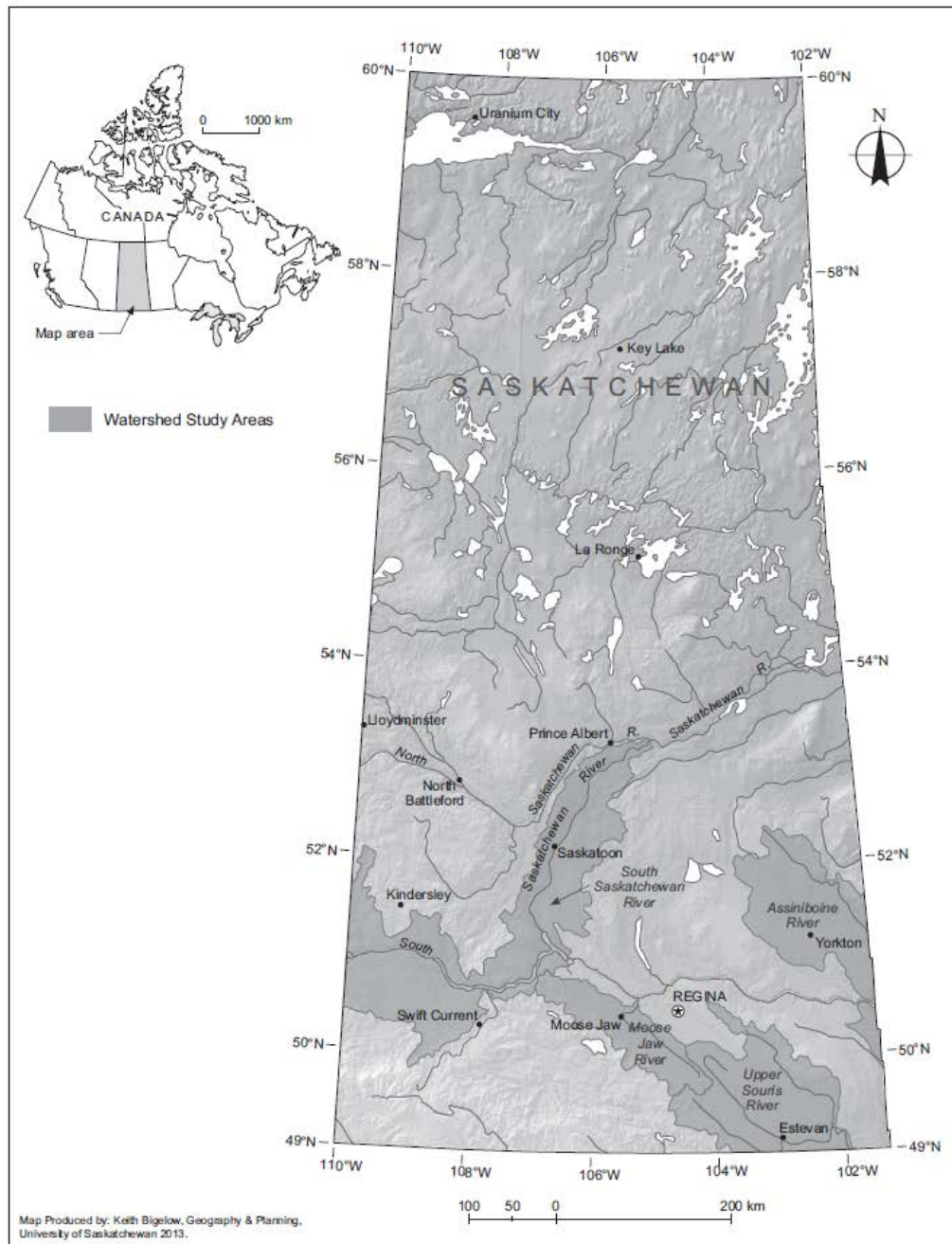


Figure 1: Watershed Study Areas

3.3.1 Moose Jaw River Watershed

The Moose Jaw River is the largest tributary of the Qu'Appelle River. The upper origin is located west of Weyburn. The river flows northwest, paralleling the edge of the Missouri Coteau, with many small tributaries entering the river from the more rugged, higher terrain to the southwest (MJRWS, 2006). The Moose Jaw River watershed includes 22 rural municipalities, 2 towns, 10 villages and the City of Moose Jaw. The population of the Moose Jaw River watershed is approximately 40,500 people. 79 percent of the population is found in the City of Moose Jaw, and another 12 percent of the population is within the 22 Rural Municipalities and 9 percent are in smaller communities (towns, villages). Cereal crops, cattle and hogs, manufacturing, service, and retail are key economic activities in the watershed. Agriculture is the major leading economic sector; approximately 70 percent of the watershed is used in annual crop production. Major agricultural activities include feedlots, cow and calf production, inland grain terminals, pork production, and orchards. Agricultural machinery is the main manufacturer. Also, Canadian Pacific Railway, World Wide Pork, XL Foods, Raider Industries, Doepker Industries Ltd., Bombadier and Mosaic Corp contribute to this area's economy (MJRWS, 2005).

3.3.2 Assiniboine River Watershed/Yorkton Region

The Assiniboine River Watershed covers an area of 17,300 square kilometers within Saskatchewan. This area includes 24 rural municipalities, eight towns, 15 villages and the

cities of Melville and Yorkton. The population of the Assiniboine River Watershed within Saskatchewan is approximately 45,500. The rural population represents about 34 percent of this total, with the urban or community population making up the remaining 66 percent. Economic activity and land uses in the watershed are dominated by mixed grain farms, with pasture and hay lands common. Traditionally, the beef cattle industry has dominated the livestock sector (AWSA, 2006). The groundwater in this area has played a vital role in the socio-economic development of the City of Yorkton since the turn of the century as it constitutes the most available source of water for the City. Major creeks are the Yorkton, Crescent, Willowbrook and Cussed Creeks. The City of Yorkton is the largest urban centre in the watershed with 37 percent of the total watershed population. Since 1890, when the City became established at its present location, groundwater has been the sole source of municipal water supply (Saskatchewan Research Council, 2006). However, this region is characterized by poorly integrated drainage systems because large area in this sub-basin area do not contribute to surface water in a normal runoff. Concerns about the potential for contamination and sustainability of the groundwater resources in the Yorkton area emphasize the needs to establish an aquifer management plan. The major components of an aquifer management plan are a groundwater allocation and protection plan (Maathuis and Simpson, 2006).

3.3.3 South Saskatchewan River Watershed

Three main rivers which originate in the Rocky Mountains contribute the water supply to

the South Saskatchewan River: the Bow, Red Deer, and Oldman rivers. The portion of the South Saskatchewan River in Saskatchewan drains an area of 35,000 square kilometers and the river flows 716 kilometers through this watershed. This river flows east into Saskatchewan where it is stored in Lake Diefenbaker. At the Village of Elbow, the river turns north and flows 380 kilometers until it joins the North Saskatchewan River east of Prince Albert (SSRWS, 2007). The South Saskatchewan River watershed is the most heavily populated watershed in Saskatchewan with roughly 300,000 residents. Most of the municipalities in this watershed get their drinking water from the South Saskatchewan River. However, most individual land owners tap into aquifers through private wells. Nearly half of the province's population depends on this river for their drinking water source. There are 19 irrigation districts in the South Saskatchewan River watershed, covering a total of 672,000 acres. Economic activities in this region consist of a variety of agricultural activities including livestock, irrigated and dry land crops, as well as seven potash mine and oil and gas production particularly in the western portion of the watershed (SSRWS, 2007).

3.3.4 Upper Souris River Watershed

The Souris River drains into North Dakota, USA, and finally flows into Manitoba. About 20,400 square km of the Souris River basin in southeastern Saskatchewan are encompassed by the Upper Souris River Watershed, including sub-watershed areas of the Souris River main stem, Long Creek and Moose Mountain Creek. In 2010, almost 32,000

people, or 72 percent of the watershed area population live in cities, towns, and villages. The area includes about 75 percent cropland, 15 percent grassland, 5 percent shrubs and trees, and 5 percent waterbodies and marshland. Economic activity and land use within the watershed is dominated by agriculture. Also, the energy sector is important to the economy; about 50 percent of Saskatchewan's production oil wells are located in this area (USWA, 2010).

3.4 Summary

Five source water protection plans in Saskatchewan were selected for analysis in this research (see Figure 1). Each plan is administered by a local watershed group. These groups are: Moose Jaw River Watershed Stewards Inc, Assiniboine Watershed Stewardship Association, South Saskatchewan River Watershed Stewards Inc, and Upper Souris Watershed Association. The Assiniboine River Watershed Stewards administers two SWP plan, the Yorkton Aquifer SWP Plan and the Assiniboine River SWP Plan. Watershed Coordinators and Board Chairs were selected from four local watershed groups for interviews in this research. As well, government agencies and NGOs were also interviewed. Interview questions sought to identify factors facilitating and constraining key action implementation. Interviewees could provide more than one response to each question. The implementation progress of these SWP plans is reported in Chapter 4.

CHAPTER 4

RESULTS

The results of this research are based on three different phases of source water protection plan implementation. There are: key actions that have been implemented; key actions that are not implemented and key actions that are still in progress. This chapter reports the results from interviews conducted with key informants to assess capacity building needs for source water protection plan implementation in the 5 selected Saskatchewan watersheds. The results revealed factors that either facilitate or constrain plan implementation based on the four types of capacity chosen from this research. These capacity types include financial, institutional, technical and social capacity issues. A summary of facilitating and constraining factors is shown in Table 4.1 and Table 4.2.

Table 4.1 Facilitating capacity factors

Ranking	Moose Jaw	Assiniboine	Yorkton	South SK	Upper Souris
First	Institutional	Financial	Financial	Social	Social
Second	Social	Institutional	Institutional	Technical	Institutional
Third	Technical	Social	Social	Institutional	Technical
Fourth	Financial	Technical	Technical	Financial	Financial

Table 4.2 Constraining capacity factors

Ranking	Moose Jaw	Assiniboine	Yorkton	South SK	Upper Souris
First	Institutional	Social	Technical	Technical	Technical
Second	Financial	Technical	Social	Financial	Financial
Third	Technical	Financial	Financial	Social	Social
Fourth	Social	Institutional	institutional	Institutional	Institutional

The most frequent facilitating factor is linked to institutional capacity; the second most frequent facilitating factor is social capacity issues. On the other hand, the most frequent constraining factor is related to technical capacity; and the second most frequent constraining factor is linked to financial capacity issues. Detailed results relating to the first and second ranks are discussed based on each SWP plan, and will be reported in the following section.

4.1 Local Watershed Groups & Source Water Protection Plans

The five SWP plans each contains SWP policies. These policies are at various stages of implementation. Results were collected by interviews and document reviews. This chapter will report the capacity-related factors that both facilitate and constrain SWP plan implementation in each of the local SWP plans.

4.1.1 Moose Jaw River Watershed SWP Plan & Watershed Stewards

The implementation success rate of the Moose Jaw River Watershed Source Water Protection Plan (2006) is reported in Table 4.3. This plan was the first to be adopted in Saskatchewan by the WSA, and represents one of the earlier plans at the Water Security Agency. There are a total of 63 key actions in this plan; as of 2013, 40 key actions have been implemented, 7 key actions are not implemented and 16 key actions are in progress of plan implementation.

Table 4.3 Moose Jaw River SWP Plan Implementation Statistics

Implementation status	Key action number	Implementation percentage
Yes	40	63%
No	7	11%
In progress	16	26%
Total	63	100%

Source: interviews (Moose Jaw River Watershed Stewards Inc)

Table 4.4 shows facilitating and constraining factors as related to the four types of capacity in this SWP plan. The table shows a total 60 responses for facilitating factors and 40 responses for constraining factors. Institutional capacity (37 percent) or 22 out of 60 responses is the greatest reported capacity factor to facilitate key actions implementation in the Moose Jaw SWP Plan. For example, a watershed interviewee stated that “the Water Security Agency is looking to expand hydrometric stations, and it is also responsible for the drought and moisture program”. Social capacity (33 percent) or 20 out of 60 responses

is the second most reported capacity factor to facilitate key actions implementation in this watershed. Social capacity involves three critical elements: leadership, partnerships and communication (Leach, 2011). One participant stated that “we have the partnership with PCAB (The Provincial Council of Agriculture Boards) to minimize impacts from unapproved drainage activities”. Another example is communication, one of the three critical social capacity elements. According to Moose Jaw River Watershed Stewards Yearly Report (2011), local producers were influenced by Moose Jaw River Watershed Stewards newsletters and articles. Some environmental adjustments in the agricultural operation have been made by local producers. Finally, technical capacity and financial capacity are the two least reported capacity factors that facilitate plan implementation.

Table 4.4 Moose Jaw River Watershed SWP Plan

Capacity	Implemented/In progress	%	Non-implemented/In progress	%
	(Facilitating)		(Constraining)	
Financial	6/60	10%	12/42	29%
Institutional	22/60	37%	18/42	42%
Technical	12/60	20%	7/42	17%
Social	20/60	33%	5/42	12%
Total	60	100%	42	100%

It should be noted that in Table 4.4 institutional capacity is reported as the most facilitating factor, and it is also noted that as the most constraining factor. This relationship may signify that in the case of Moose Jaw River watershed, the institutional capacity factor is the most significant of all in capacity factors. The Table 4.4 shows that institutional capacity (42 percent) or 18 out of 42 responses is the most reported capacity factor constrain key actions implementation in the Moose Jaw watershed. One example is related

to reviewing of Agricultural Operation Regulations for winter manure spreading. The watershed coordinator noted that “the Ministry of Agriculture is leading this program, and they are also policing it. However, it cannot be policed. Producers will know who complained because the person who complained has to sign his name on the form”. Indeed, government regulations do not allow local people to protect water resource without first disclosing their name. Moreover, the Water Security Agency (SWA) conducted the plan process for the Moose Jaw River watershed in 2006; currently several key actions from the original SWP plan are described by the watershed coordinator as unachievable and unreasonable. For example, one key action in this plan states that a yearly payment program for ecological goods and services (EG&S) needs to be explored. However, as noted by the watershed coordinator: “I have gone through other watersheds EG&S, and attended related conferences and workshops. The Moose Jaw watershed doesn’t fit the model to develop EG&S”. Financial capacity (29 percent) or 12 out of 42 responses is the second most reported capacity factor to constrain plan implementation in this watershed. For example, lack of operation and research funds is the most common reason for slow plan implementation. The watershed coordinator stated that “Money is the main constraining factor. The issue is I try to delivery [the clean-up project] for an old dump site along the river, and it is very expensive for the environmental impact assessment prior to, and after decommissioning”. Finally, technical capacity and social capacity are the two least reported factors.

4.1.2 Assiniboine River Watershed SWP Plan & Association

The implementation success rate of the Assiniboine River Watershed Source Water Protection Plan (2006) is reported in Table 4.5. There are a total of 44 key actions in this plan; as of 2013, 21 key actions have been implemented, 7 key actions are not implemented and 16 key actions are in progress of plan implementation. The Assiniboine Source Water Protection Plan was the second plan to be adopted by the Water Security Agency (WSA). Approximately 50 percent of the key actions in this source water protection plan have been implemented.

Table 4.5 Assiniboine River SWP Plan Implementation Statistics

Implementation status	Key action number	Implementation percentage
Yes	21	47%
No	7	16%
In progress	16	36%
Total	44	100%

Source: interviews (Assiniboine Watershed Stewardship Association)

Table 4.6 shows facilitating and constraining factors in this SWP plan. The table shows a total 53 responses for facilitating factors and 29 responses for constraining factors. Financial capacity (43 percent) or 23 out of 53 responses is the greatest reported capacity factor. For example, sufficient financial support from different organizations is necessary for conducting SWP projects. The watershed coordinator reported that:

“We get some money from Saskatchewan Ministry of Environment. Also we receive funding from the Water Security Agency and Saskatchewan Wildlife Federation to remove fish barriers”.

Institutional capacity (38 percent) or 20 out of 53 responses is the second greatest reported capacity factor to facilitate key action implementation in this watershed. The WSA is not the only government agency to help with local watershed groups, other government agencies such as the Ministry of Agriculture and Ministry of Environment are also leading several SWP related projects. In the words of the watershed coordinator: “We have help from the Saskatchewan Ministry of Agriculture and get direction from them on Beneficial Management Practices (BMPs), so we can work with producers for AEGPs (Agriculture Environmental Group Plans) to address the environmental issue”. Finally, social capacity (15 percent) and technical capacity (4 percent) were identified as the two least reported capacity factors to facilitate the plan implementation.

Table 4.6 Assiniboine River Watershed SWP Plan

Capacity	Implemented/In progress	%	Non-implemented/In progress	%
	(Facilitating)		(Constraining)	
Financial	23/53	43%	9/29	31%
Institutional	20/53	38%	1/29	3%
Technical	2/53	4%	9/29	31%
Social	8/53	15%	10/29	34%
Total	53	100%	29	100%

It should be noted in Table 4.6 that financial, technical and social capacity factors were reported as identical as constraining factors in this SWP plan. Social capacity (34 percent) or 10 out of 29 responses is the most reported capacity factor to constrain key action implementation in the Assiniboine watershed. Currently four AEGPs are being operated in

this watershed and these projects need public involvement. The watershed coordinator stated that “It is hard to physically sit down with local producers to develop the manure management plan. We have attempted to do it, but it might be the factor of producers not willing to do this. Also, in the wetland restoration project, there are some barriers and constraints from landowners because they are not willing to sign the agreement”. Technical capacity (31 percent) or 9 out of 29 responses and financial capacity (31 percent) were the second most reported capacity factors to constrain key actions implementation. Without the stable funding support, the local watershed group might not engage in plan implementation. For example, the watershed coordinator reported that “We just had the funding available to take out the fish barrier structure and remove the barriers. If there is more funding available, we would have removed more structures”. The watershed board chair also mentioned that “the main barrier for plan implementation is lack of core funding from the province. We don’t have funding to carry on the program, and are not able to do the field work”. Moreover, technical capacity includes physical infrastructure and personnel to develop source water protection (de Loë, 2006). Lack of human resource was considered a technical capacity constraint in this watershed. For example, according to the watershed coordinator:

“The constraining factor for plan implementation is lack of staff and time, which caused limited communication between us and Saskatchewan Ministry of Environment. We have some information about Yorkton Creek and the Whitesand River, but we haven’t dug into any depth due to the lack of staff and time. We have done a little bit like nutrients in the plant effluent, but we don’t know exactly what the environmental fact is, again, lack of staff and time”

4.1.3 Yorkton Area Aquifer SWP Plan

The Yorkton Area Aquifer SWP Plan is selected in this research because it is the only particular groundwater protection plan of the WSA. Table 4.7 shows a total of 23 key actions in this plan; as of 2013, 14 key actions have been implemented, 4 key actions are not implemented and 5 key actions are in progress of plan implementation.

Table 4.7 Yorkton Area Aquifer SWP Plan Implementation Statistics

Implementation status	Key action number	Implementation percentage
Yes	14	61%
No	4	17%
In progress	5	22%
total	23	100%

Table 4.8 shows capacity related factors facilitating and constraining SWP plan implementation. It states a total 25 responses for facilitating factors and 12 responses for constraining factors. Financial capacity (56 percent) or 14 out of 25 responses is the most reported capacity related factor facilitating plan implementation. The Assiniboine watershed coordinator reported that:

“We had funding from Saskatchewan Ministry of Environment to develop the vulnerable aquifer map. So now we have created the map and keep distributing it. We have had the financial support to create browsers, publications, and we keep educating people”.

Institutional capacity (24 percent) or 6 out of 25 responses is the second most reported capacity factor. One example is the well decommissioning program, the local watershed

group receives the direction of the Water Security Agency in order to easily work with local producers. Another example, the Assiniboine watershed coordinator expressed: “there is to be a zoning district established, so we have the ability to do aquifer protection. The Water Security Agency and municipalities wanted us to participate with this district. So they are willing to work with us”.

Table 4.8 Yorkton Area Aquifer SWP Plan

Capacity	Implemented/In progress		Non-implemented/In progress	
	(Facilitating)	%	(Constraining)	%
Financial	14/25	56%	3/12	25%
Institutional	6/25	24%	2/12	17%
Technical	1/25	4%	4/12	33%
Social	4/25	16%	3/12	25%
Total	25	100%	29	100%

Table 4.8 shows capacity-related factors that constrain plan implementation are all relatively equal across the four capacity factors. Technical capacity (33 percent) or 4 out of 12 responses is the most reported capacity factor to constrain plan implementation in the Yorkton region. The concern of human resources was the most common limitation. For example, the watershed coordinator reported: “The constraining factor is basically because of lack of staff and time and concern about the staff availability”. Financial capacity (25 percent) or 3 out of 12 responses and social capacity (25 percent) are tied as the second most reported capacity factor to constrain plan implementation.

4.1.4 South Saskatchewan River Watershed SWP Plan & Stewards

The South Saskatchewan River Watershed is an important study area because more than half of Saskatchewan's population depends on drinking water from the South Saskatchewan River (SSRWS, 2007). The implementation success rate of the South Saskatchewan River Watershed Source Water Protection Plan is reported in Table 4.9. There are a total of 35 key actions in this plan; as of 2013, 13 key actions have been implemented, 13 key actions have not implemented and 9 key actions are in progress of plan implementation. The South Saskatchewan River SWP Plan was adopted in 2007. This plan represents one of the earlier plans at the Water Security Agency. Staff turnover and watershed complexity may explain the relatively high rate of non-implemented and in-progress key actions in this plan.

Table 4.9 South Saskatchewan River Watershed Plan Implementation Statistics

Implementation status	Key action number	Implementation percentage
Yes	13	37%
No	13	37%
In progress	9	26%
Total	35	100%

Table 4.10 shows facilitating and constraining factors in this SWP plan. The table shows a total of 26 responses for facilitating factors and 38 responses for constraining factors. Social capacity (34 percent) or 9 out of 26 responses is the greatest reported capacity

factor. One example of a social capacity factor is to develop a watershed education strategy. The watershed manager reported:

We have the information on our website and also provide it in newsletters. We have presentations and different conferences. The most important thing is the committee representation of our board members. They are from rural municipalities, city of Saskatoon, and many producers.

Technical capacity (31 percent) or 8 out of 26 responses is the second greatest reported capacity factor to facilitate key actions implementation in this watershed because several specific background coordinators have been hired in the local watershed organization. The watershed manager stated: “Our full time education coordinator can work, communicate, and get in touch with industry, Water Security Agency and other organizations and stakeholders. Also we hire our full time environmental coordinator to do some research for the water contamination project”. Finally, institutional capacity (23 percent) and financial capacity (12 percent) are facilitating capacity factors that are least present.

Table 4.10 South Saskatchewan River Watershed SWP Plan

Capacity	Implemented/In progress	%	Non-implemented/In progress	%
	(Facilitating)		(Constraining)	
Financial	3/26	12%	13/38	34%
Institutional	6/26	23%	4/38	10%
Technical	8/26	31%	16/38	43%
Social	9/26	34%	5/38	13%
Total	26	100%	38	100%

Table 4.10 also shows that technical capacity (43 percent) or 16 out of 38 responses is the most reported capacity factor to constrain key actions implementation in the South Saskatchewan River watershed. The local watershed group has identified gaps in the information currently available. Gaps also exist in the number of staff turnovers, the frequency at which watershed manager change. Water Security Agency staff members provided some important comments: “the South Saskatchewan River Stewards has been struggling with staff turnover; especially the watershed coordinator”. This human resource problem could also affect the process of plan implementation. Financial capacity (34 percent) or 13 out of 38 responses is the second most reported capacity factor to constrain plan implementation. One of the external funding sources for the local watershed group comes from their individual member fees. The South Saskatchewan River watershed group charges their membership fee, which are predominantly municipalities, based on population size. Municipalities pay between \$100-1,000 depending on the size of the community. The City of Saskatoon is an exception, paying \$20,000 to the SSRWS for a membership fee. However, this amount does not leave a lot of extra money for SWP project funding once full-time staff salaries have been paid. Finally, social capacity (13 percent) and institutional capacity (10 percent) are the least reported capacity factors to constrain plan implementation.

4.1.5 Upper Souris River Watershed SWP Plan & Stewards

The implementation success rate of the Upper Souris River Watershed Source Water Protection Plan is reported in Table 4.11. The Upper Souris River Source Water Protection Plan was selected in this research because it is the most recent plan from Water Security Agency. There are a total of 36 key actions in this plan; three key actions have been implemented, six key actions have not been implemented and 27 key actions are in progress of plan implementation.

Table 4.11 Upper Souris River SWP Plan Implementation Statistics

Implementation status	Key action number	Implementation percentage
Yes	3	9%
No	6	16%
In progress	27	75%
Total	36	100%

Table 4.12 shows facilitating and constraining factors in this SWP plan. The table states a total 25 responses for facilitating factors and 47 responses for constraining factors. Social capacity (36 percent) or 9 out of 25 responses is the greatest reported capacity factor to facilitate key actions implementation in the Upper Souris River watershed. For example, local awareness was a concern for the wetland restoration program; the watershed coordinator stated: “We promote watershed retention to improve the watershed health. We put the information into articles and websites. We offer programs and workshops for producers. We are providing the ideas to let producers restore their wetland”. Institutional

capacity (32 percent) or 8 out of 25 responses is the second greatest reported capacity factor to facilitate plan implementation. The leading government agency has been playing an important role for planning and operating projects. The watershed coordinator expressed one example of Rafferty/Alameda Land Management Strategy:

We work with the Water Security Agency to help them develop some crown land management with producers. SWA owns all lands around those dams. I have received a copy of the crown land management strategy. The process of going through it is to look at the key action item in it, and to see what items Upper Souris can help to provide for implementing programs. So it is the process just going to the book to see what fits its mandate and what is achievable for us to do. The factor facilitating is having the relationship with Gary Neil (Manager, Planning and Lands Management, SWA) who is the manager of all these lands.

Technical capacity (20 percent) and financial capacity (12 percent) were the least capacity factors to facilitate the plan implementation.

Table 4.12 Upper Souris River Watershed SWP Plan

Capacity	Implemented/In progress	%	Non-implemented/In progress	%
	(Facilitating)		(Constraining)	
Financial	3/25	12%	13/47	28%
Institutional	8/25	32%	5/47	11%
Technical	5/25	20%	18/47	38%
Social	9/25	36%	11/47	23%
Total	25	100%	29	100%

Table 4.12 also shows constraining capacity factors. Technical capacity (38 percent) or 18 out of 47 responses is the most reported capacity factor to constrain key action

implementation in the Upper Souris River watershed. Currently, there is only one full time staff member working in the association when compared with other local watershed stewards who have two or three staff members. This problem could affect communication and education performance of the association. The watershed coordinator stated:

I don't have experts to know enough about it, and to do a good job to help developing education programs. We haven't done the research yet. We just need a person; I don't have enough people yet. Our limiting factor is I don't have enough human resource. Just need a staff for communication to the rural municipalities (RMs), do some phone calls and do a survey. We need experts to understand the data, and to access the data. We haven't successfully directly consulted with people, local people. It takes time, and time is a limiting factor, and we need staff members to keep calling people

Financial capacity (28 percent) or 13 out of 47 responses is the second most reported capacity factor to constrain plan implementation in this watershed. Considering the operation budget perspective, several source water protection programs could not cover the operating cost. One participant stated: "Funding and human resource go hand and hand; like the AEGP program, the local watershed group only gets 10% back for its administration cost". Another example is the program of restoring wetland and riparian area; the watershed coordinator stated: "It is going to take lots of money to get really good work done. The limiting factor is lack of funding available". Finally, social capacity (23 percent) and institutional capacity factors (11 percent) were reported to constrain the plan implementation.

4.2 Provincial organizations

The final section provides a synthesis of the capacity areas in greatest need, as identified by the provincial government agency and NGO participants. Interview information is used for the data analysis.

4.2.1 Leading Agency: Water Security Agency (WSA)

The Water Security Agency (WSA) leads management of the province's water resources to ensure safe drinking water sources and reliable water suppliers for economic, environmental and social benefits for Saskatchewan people (SWA, 2010b). All results in this section were provided by the WSA staff members in the Planning Branch and the Implementation Branch.

4.2.1.1 Core funding

Several participants from the Water Security Agency (WSA) reported that “When first starting the source water protection plan implementation, SWA provided \$25,000 to local watershed groups and increased to \$80,000 several years ago. And now groups are getting \$92,500 funding support a year, but this support has been staying at the same amount for several years”. Also, any “soft money” from SWA is actually decreasing overtime, and the reduced amount of soft money could be a limitation for operating local watershed SWP

programs. This means local watershed groups will receive the less of one time funding from governments for special projects. With the limited funding support, local watershed groups should build their own capacity to access external funding sources. One government participant said: “You can’t give local watershed groups everything that they ask. They have to build their own ability to move forward”.

4.2.1.2 Other barriers

The first barrier is lack of stakeholder involvement. Each group has its members and collects membership fees. Lack of strong membership or partnership is a major constraining factor. One government staff member stated that: “[Local watershed groups] need to communicate effectively with stakeholders. Because the groups are in the public engagement process, they have to deal with and communicate with local people”.

The ability of groups to have permanent job positions is the second barrier. The staff turnover is affecting the local watershed group and the plan implementation process. One government participant stated that: “Most of the coordinator positions are permanent. However, some watershed groups can not offer the permanent jobs to other staff members. The suggestion is hiring the coordinator in the beginning of the plan implementation, and this will speed up the implementation process”.

The local watershed groups need to renew some of the plans because many plans are six years old; some key actions are unachievable. These key actions need to be changed or

removed; such updates will make the plan more reasonable and achievable. One interviewee stated that: “Some plans are long and complex, like 160 key actions. If you have a plan, you have to have a very clear direction and recommendation”. Indeed, having a reasonable numbers of key actions will be easier for local watershed groups to focus on.

4.2.2 Other Government Agencies

- Ministry of Agriculture

Saskatchewan Ministry of Agriculture has been directly or indirectly working with local watershed groups and the WSA in order to protect water resource. The Ministry of Agriculture assists those agricultural portions of SWP plans. One interviewee mentioned that “by reviewing the source water protection plan implementation process, a lot of projects focus on agriculture practices”. The Ministry of Agriculture is operating 27 Agriculture Environmental Group Program (AEGP) groups in different watersheds such as the Environmental Farm Program and Farm Stewardship Program.

Financial and technical supports are considered as the most likely to facilitate or most common facilitating factors for Ministry of Agriculture to assist the SWP plan implementation. The budget for Ministry of Agriculture has been increasing. One participant reported that “approximately over \$800,000 is to put into 27 AEGP for delivery purpose. Each group can hire technicians; pay staff wages. These hopefully could help with source water protection”. For the technical perspective, the participant also provided

one example that: “the Ministry of Agriculture includes 10 regional offices in the whole province, and many agricultural specialists could provide the technical support for the agricultural part of source water protection plan implementation”.

However, the barrier for source water protection plan implementation is that the AEGPs’ boundary could affect the source water protection plan implementation process. According to the regional office manager:

There are only two AEGPs exactly covering the watershed boundary. Ministry of Agriculture has been providing the funding to the watershed group people in order to implement the AEGP program. However, there are only three AEGPs exactly covering the watershed boundary comparing with others. Most of AEGPs are RM basis which is hard for AEGP and watershed staff to work together. In the Assiniboine watershed case, 4 AEGP programs are running in the whole watershed together. They receive funding from Water Security Agency, and also get the funding from agriculture group plan initiative. But in other watersheds, like Upper Souris, their AEGPs are run by agriculture groups themselves which are separated from watershed group, and even the funding is separated from watershed group. I still think they are not directly working with source water protection people. We want to change that, we would like to make it like the Moose Jaw or the Lower Souris case

4.2.3 Saskatchewan Association of Watershed

The Saskatchewan Association of Watershed (SAW) is the umbrella non-government organization for the whole watershed in this province. The SAW experiences that funding

is the major barrier for all Saskatchewan local watershed groups. The budget for plan implementation is actually decreasing. One SAW participant stated that:

“We used to discuss several agreements with the government agency about the funding contribution formula based on size of land area and population. In another words, a watershed group with a large watershed should receive more financial support than small ones. However, the agreement is eliminated, and each watershed group gets the same amount”.

Also, one board member from SAW reported that: “there was a push three years ago from SAW to help all local watershed groups to receive more core funding, \$12,000 per year. However, there is no indication that the core funding will be increased in next year”. Moreover, there is evidence from the Minister of Environment that funding will not be increased:

The province is demonstrating fiscal responsibility and striving for efficiencies. At this time, I am unable to offer any commitment on your request for an increase in funding for the 2013-2014 fiscal year.

One participant from SAW provided an overview for several local watershed groups, and he had been addressing several challenges and issues which contribute to the lessons learned from the SWP plan implementation:

Moose Jaw River watershed SWP plan is about six years old, and the plan is under the watershed renewing process which will be an important step for the next few years. Also the local watershed group is capable to move forward with some innovative projects. South Saskatchewan River Watershed Stewards has been struggling with the staff turnover; and the size of watershed makes it very

difficult to implement the plan when compared with the Moose Jaw or Upper Souris watershed. Also, the local watershed group did not have a chance to access funding in the beginning of the plan implementation process. The Assiniboine River Watershed Stewards has done many innovative programs. For example, the group finished many wetland restoration projects. Also, the plan has been moving forward which is closed to the watershed and aquifer plan renewing process. The suggestion from SAW is that even though several key actions are not achievable, but the source water protection issues from those key actions should be recognized

4.3 Summary

This chapter presented the results from interviews conducted with key informants to assess the capacity building needs for the implementation of various plans. According to this research, the participants reported a greater presence of the institutional and social capacity factors to implement SWP plans. The provincial organization key informants were much more likely to indicate that capacity needs were being met. As well, they were also able to identify capacity areas that they considered to be facilitating or constraining local watershed group efforts. The capacity constraints to SWP plan implementation include, lack of stable funding sources, limited information and data sharing, weak communication between local watershed groups and local producers, need for public awareness about SWP, and updating the SWP planning process. Some of the capacity needs that appear to be facilitating the SWP process include: government policies and assistants, the cooperation between local watershed groups and different government agencies.

The SWP plans for Saskatchewan watersheds began to be published in 2006. Now, several opportunities and limitations have been evaluated to help with implementing SWP plans. The following chapter will discuss the implications of these research findings and make connections to the broader literature. Limitations of this research and suggestions for future research will also be reported.

CHAPTER 5

DISCUSSION

Discussion of the results will be separated into the following sections: financial capacity; institutional capacity; technical capacity; social capacity; and capacity relationships.

5.1 Financial capacity

Funding opportunities, especially stable and consistent internal and external financial support, is considered a critical need for SWP plan implementation. Most local watershed groups have been facing the problem of financial constraints since their associations were established. The WSA has already recognized that local watershed groups require assistance to implement their SWP plans. Unfortunately, this type of funding does not necessarily address concerns relating to the daily and long term operating costs. According to the request for increasing core funding, the Saskatchewan Association of Watersheds (2012) indicates that the average operation expense is about \$151,080 for each local watershed groups, much higher than the amount of core funding now available \$92,500. Moreover, participants from local watershed groups reported that the main constraining factor is project cost, and there is no payment program unless the government sets up the payment. According to de Loë and Kreutzwiser (2005), the most challenge for local watershed groups to undertake various SWP projects is to secure and commit funding. Litke and Day (1998) also state that “a lack of financial support would reduce the effective planning and

management ability of different agencies and organizations”. The US Environmental Protection Agency experience provides a positive lesson that encourages states to use a portion (15%) of funds granted under the Clean Water Act for groundwater protection. Some of the funding available (\$26 billion) through the State Drinking Water Revolving Fund can be set aside for groundwater protection and capacity building (de Loë & Kreutzwiser, 2005). Indeed, local water protection organizations in the US have the availability of these funds to undertake source water protection activities. In Saskatchewan, the WSA provides a portion of core funding in the beginning of the year to help the operation of local watershed groups. According to the interview, 65% of core funding has been paid for local watershed groups, and the WSA requests the accounting report at the end of the year. Hence, this research recognizes the importance of making a commitment to funding mechanism for implementing SWP plans.

The second observation is that local watershed groups should be financially independent to conduct their long-term projects. In Saskatchewan, although local watershed groups receive core funding from the Water Security Agency (WSA), they still need external financial support from different government agencies and NGOs. Several successful local watershed groups have applied for funding support from the Saskatchewan Ministry of Environment, Ministry of Agriculture, Ducks Unlimited, and Saskatchewan Wildlife Federation. This funding has been applied to wetland conservation, fish habitat, and agriculture environmental plans in their watershed. Even though core funding from the WSA may be reduced, local watershed groups should improve their financial ability to obtain external funding. These results are consistent with Brown’s (1980) statement

“heavy reliance on financial support from senior governments may affect a local watershed management groups’ financial capacity to function independently”. This has occurred in Ontario where reduced funding sources could seriously undermine a local water management groups’ ability to deliver SWP programs (de Loë et al, 2002).

5.2 Institutional capacity

As previously mentioned, institutional capacity was considered to be one of the successful capacity factors. However, this section discusses both facilitating and constraining issues for the plan implementation process. The first observation is that a clear oversight role for the Saskatchewan government, and specific responsibilities and assistance for local watershed groups, would remove much of the constraints that contribute to the current implementation gap. According to staff members from the WSA, it was stated that this agency could play an important leadership role by providing mapping and technical information on species at risk for the Government of Canada Habitat Steward Program. Also, since most local watershed groups do not contain enough financial credits, the WSA regulates the funding distribution policy for providing a certain portion (65%) of core funding at the beginning of every year. This will allow local watershed groups to pay for office rent and other expenses.

Institutional arrangements need to be developed that encourage water-related agencies to coordinate and establish mutually agreed priorities for investment, regulation, and

allocations to support SWP. This approach is also supported in the water resources literature (Hamdy et al, 1998). Timmer et al (2007) also states that “a provincial water protection agency should consult with local community members to help develop and enforce regulations in local watersheds”. Following this framework, it is important that the WSA establish a priority to review local watershed management activities and enforce consistency with the provincial safe drinking water strategy. A significant role for the WSA is to help local watershed groups establish their associations to reach non-profit status and to establish constitutional bylaws. Another example is for planners from the WSA Planning Branch to work directly with local watershed groups to initiate SWP plan development and implementation.

Provincial governments define the legislative power of municipal government in Canada; therefore, any weakness in provincial legislation and regulation has a direct impact and may affect municipal operations (Timmer et al, 2007). In Saskatchewan, SWP enforcement is not enough to protect source waters because SWP plan implementation is the voluntary and non-legislated activity. It would be helpful for a SWP plan to be established through legislation and enforced by regulations. Based on the interviews, it appeared that regulations are needed to prevent activities that would result in source water pollution, such as illegal dumping and littering. One local watershed coordinator indicated that local watershed groups do not have sufficient human resources to enforce littering restriction set out in the SWP key action list. Indeed, some SWP plan implementation key actions are not enforceable much less achievable.

5.3 Technical Capacity

Two observations are discussed in this section: human resource and information/data sharing and availability. These two observations also follow the definition from de Loë (2002) that technical capacity includes both the adequacy of physical infrastructure and the human resource training. First, human resources were noted as barriers to the SWP plan implementation. In Saskatchewan, human resource conditions are highly different among local watershed groups. According to interviews, several local watershed groups have two or three staff members in their daily operations; they employ technicians, financial officers, and environment and education coordinators. De Loë et al (2002) also states that sometimes the critical issue is staff resources, especially, “the availability of staff with specialized knowledge needed to undertake key actions, or to process and use information relating to source water protection”. Staff members from the WSA recommended that two or three people working at each local watershed group would be the desirable number rather than one single coordinator. Another suggestion from the WSA is that hiring the coordinator when the plan was adopted would help local watershed groups avoid staff turnover. However, it may be difficult in smaller communities to afford human resource costs (Timmer et al, 2007). For example, in Upper Souris Watershed Association, there is only one full time coordinator working in this entire organization. Therefore, local watershed groups must rely on external specialists to work on different projects, and this could be considered as one reason for slow plan implementation.

Also, the results from this study indicate that there is a need for more training especially among coordinators and more professional education for local watershed groups. Hamdy et al (1998) states that: “training and staff development should undoubtedly have high priority for source water protection”. According to the interview, government agency participants noticed that the coordinator should receive some management training. Hartvelt and Okun (1991) also stated that “water protection staff members are motivated and challenged with opportunities to increase skills and abilities through training and education programs. This can build human capacity but requires time to develop as organizations grow”.

The second observation is the general lack of data/information for implementing SWP plans. Since the ability of local organizations to undertake water protection depends on the technical capacity, it is essential to have data access, such as water quality and potential chemical contaminants (Ffolliott et al, 2002; Focazio et al, 2002). Local watershed participants did not have access to water data and may lack necessary knowledge to analyze the data. One watershed participant complained that the water monitoring system in Canada is not as detailed as in other countries, and that the government is not investing in water quality testing. Also, some local watershed participants claimed that they had difficulties accessing information basic water quality parameters because of privacy issues of government agencies. Timmer et al (2007) reported that “the technical capacity of governments to protect source water supplies can be demonstrated by the existence of watershed monitoring programs; the availability of easily accessible watershed data and inventories of potential contaminants”. This observation suggests that government

agencies need to share information and data for local watershed groups working on the source water protection plan implementation. It is important to create and develop the open communication and participation from technical support for the SWP plan implementation (Hamdy et al, 1998).

5.4 Social capacity

Lack of public involvement in SWP plan implementation was an observation in this research. The public within each watershed were involved in their respective SWP plan implementation process in Saskatchewan, but the extent of the involvement was not always sufficient. The interview results show that greater public involvement is needed for SWP implementation. This is consistent with observations that the benefit of citizen participation in source water protection is a strong base of support for water protection initiatives (de Loe 2002). For example of the AEGPs in Saskatchewan, the lack of local land owners' support and participation is a constraining factor. This situation meant that only a small amount of local people may be aware of the AEGP project. The best solution to overcome the lack of public involvement is "combining local people's scientific and cultural experiences" (Timmer et al, 2007). If local land owners have gained the interest and awareness during the SWP plan implementation process, particularly for conducting the AEGP program, they would more likely participate in such a program. Overall, based on all interview results, local support and involvement is an important path to be successful for SWP plan implementation in Saskatchewan watersheds.

Partnerships of social capacity building have played an important role for SWP plan implementation in Saskatchewan. Many local watershed groups have been working with different organizations and academic research institutes (e.g. University of Saskatchewan); such partnerships may allow for technical and financial assistance. According to Ivey et al (2006), the social support and involvement is “a key element of municipal capacity for source water protection. Without the support of senior and local government politicians and staff, local businesses, farm industry, and individuals, source water protection may not become a priority”.

5.5 Connections among capacity factors

Based on interview results, four capacity factors may correspond to each other, and some key actions in the SWP plans require the building of more than one capacity type. The first observation is that institutional capacity is influenced by human resource factors as well as financial capacity factors. According to Ivey et al (2006), “selection, development, implementation, and enforcement of institutional arrangements for source water protection also require commitment of adequate and appropriate financial and staff resource”. In Saskatchewan, both staff members in government agencies and local watershed groups are encouraged to conduct SWP plan implementation projects. However, based on the interview results, local watershed groups in Saskatchewan have been constrained by a lack of human resources because they cannot offer permanent positions except for coordinators. The lack of human resource affects the communication between local watershed groups

and provincial agencies, and reduces institutional capacity. These factors combine to show the implementation of SWP plans. This follows Hamdy et al (1998) statement that the performance of local capacity building relies on staff members who received appropriate salaries. The better quality of human resource could cause the better appropriated institution which help to build the local capacity to implement source water protection plans.

Another observation is that technical and financial capacity factors are correlated to each other. Many groundwater testing and protection projects are technically oriented, and these are quite expensive. De Loë et al (2002) state that “the size of an organization’s budget is one of the factors that determine how much money can be spent on these technical requests”. According to interviews in this research, local watershed coordinators claimed that SWP plan implementation projects cannot be completed without sufficient and reliable funding resources. This also follows the statement from de Loë and Kreutzwiser (2005) that financial and technical capacity building measures is a priority when water initiatives implemented the Clean Water programs in Ontario.

The third observation is that the lack of human resource is linked to other capacity building needs especially public awareness and involvement. Without sufficient communications by staff members, local watershed groups can not involve all stakeholders from different sectors like rural municipalities, cities, industry, and local producer groups. According to de Loë et al (2002), “community commitment can enhance a local water

protection organization's capacity by increasing knowledge, skills, credibility, and financial resources".

5.6 Summary

Overall, the research results were consistent with observations from other Canada-wide studies on capacity building needs for SWP implementation. The combination of capacity building needs required for SWP plan implementation in Saskatchewan are unique to different local watershed groups. The next chapter will conclude this research by providing lessons learned, recommendations and suggestions for future research on this topic.

CHAPTER 6

CONCLUSION

This chapter highlights the significance of: 1) the research findings including summaries and recommendations, 2) the research contribution and 3) research limitation and future research opportunities.

6.1 Research Significance

The main significance of this research is the identification of specific capacity building needs for SWP plan implementation in Saskatchewan. Capacity factors work to both facilitate and constrain SWP planning. Local watershed groups and government agencies/NGOs report that some capacity factors were being met for plan implementation. Participants generally felt that the following capacity areas were being met: financial capacity such as basic core funding, NGO's financial support and watershed membership fees; institutional capacity such as government cooperation and assistance; technical capacity such as a permanent watershed coordinator position and mapping information; social capacity such as education programs, public awareness and engagement. These facilitating factors assisted with the SWP plan implementation processes as well as the successful lessons learned from the research. At the same time, several capacity factors were identified as not necessarily being met to support the plan implementation process. These capacity needs are: financial capacity such as a stable funding source and long term

budgeting; institutional capacity such as identification of a lead agency, inter-government communications and adequate provincial regulations and policies; technical capacity such as data/information sharing, local watershed staff turnover and beneficial training programs; social capacity such as landowners' involvement and industry communications. The following recommendations are provided to help improve SWP plan implementation in Saskatchewan and Canada.

Recommendation 1

Financial support from the WSA needs to be more reliable especially for local non-governmental groups working on SWP plan implementation. Without sufficient funding, many constraining factors relating the plan implementation will occur, such as lack of public education and awareness, lack of government communication, lack of staff stability and encouragement, lack of information sharing and lack of professional development. This recommendation requires capacity building needs for local watershed groups to become financially independent.

Recommendation 2

Standard training provided by the WSA is needed for local watershed staff members. Some training opportunities such as accounting, financial management, and human resource management will help to improve skills to generate external funding support. This recommendation requires technical capacity building needs, and relates to financial

capacity building needs. SWP training in the area of plan development and facilitation of community workshops would be beneficial.

Recommendation 3

The fixed core funding mechanism provided by the WSA needs to be revised. The amount of funding distributed to watershed groups should be prorated based on watershed conditions such as population, watershed size, number of cities and towns within the watershed. This recommendation requires institutional capacity building to further positive relationships between the provincial government and local watershed groups.

Recommendation 4

Source water protection plan key actions or implementation statements need to be clear, achievable and reasonable. Most of the participants believe that the current SWP plans are not sufficiently achievable provide watershed groups the clear instruction regarding the implementation process and priorities. Additionally, some key actions were noted by participants to be unachievable in terms of their implementability. Suggestions to make the plans more achievable to implement include more consultation and engagement among the Water Security Agency (WSA), local watershed groups, industry, residents, and landowners. This recommendation would require discussion and consultation between WSA and local watershed groups. It is also timely to not only evaluate how effective the process of SWP plan implementation has been, but also to evaluate local watershed groups in terms of their understanding of the WSA source water protection framework.

Recommendation 5

Local watershed groups need more municipal support. Without municipal support, many constraining factors will emerge relating to plan implementation, such as lack of local involvement and consultation, lack of municipal communication, and lack of public trust. This recommendation requires social and institutional capacity building needs.

Recommendation 6

The WSA should identify the different stages in the implementation process for the local watershed groups as shown in Figure 2. Stage 1 & Stage 2 are considered as the implementation process for new watershed organizations; Stage 3 & Stage 4 are considered as the process for well established organizations.

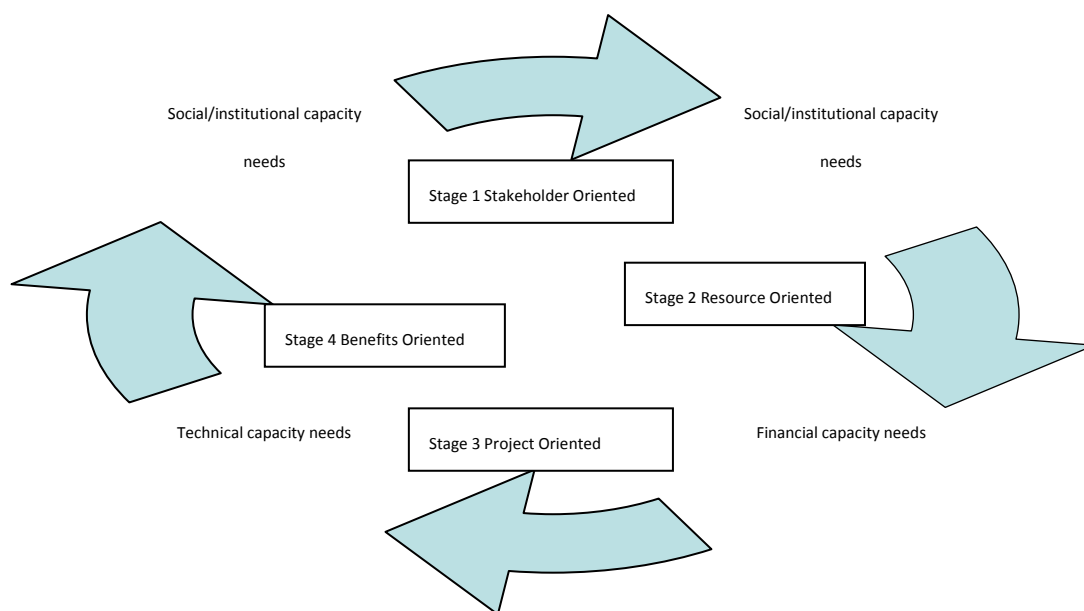


Figure 2 Implementation Stage Model

In Stage 1 (Stakeholder Oriented), local watershed groups are newly established and

request social and institutional capacity for initialization of work. Government initiatives need to be responsible for local watershed groups in order to provide available resources involving in SWP. Institutional and social capacity needs are required to build the foundation for future SWP implementation process. This stage would allow local watershed groups to gain an understanding of the social context in their watersheds, and then use this understanding to apply for external funding for the implementation process. Financial capacity is needed when implementation organizations move to Stage 2 (Resource Oriented). Seeking internal and external financial sources and budgeting SWP projects are included in implementation programs. This stage would be the preparation for existing and future SWP projects. Stage 3 (Project Oriented) indicates that if an effort is not made to improve the technical and human resource capacity areas, SWP may not be effectively achieved and source water may be at risk of future contamination. In Stage 4 (Benefits Oriented), environmental and operational benefits should be considered as the implementation goal and project objective. Also, it is not only the final stage for SWP plan implementation evaluation with local and government involvement, but it also indicates the future development opportunities from the existing implementation results. More and more government agencies and stakeholders should be involved in the next SWP implementation stage. This model would be helpful for local watershed groups to define their current and future plan implementation capacity needs and to conduct effective SWP implementation projects. In some cases, Stage 1 and Stage 2 could be applied and conducted at the same time depending on the organization of capability such as staff resource, time and so on.

6.2 Research contributions

This research verified the importance of four capacity related factors, and that capacity needs are not homogenous across all local watershed groups which are implementing SWP plans. As might be expected, capacity building needs may vary among different Saskatchewan watersheds. The results of this study indicate that in the absence of capacity components: social capacity, institutional capacity, SWP plans will be difficult to implement in this province because government and the local community are the main source of financial support affecting technical capacity in the future. As a result, local watershed groups may experience the time delay of SWP plan implementation. In a worst case, this delay in SWP plan implementation may cause a risk of water contamination. A pre-assessed mechanism from the SWP “lead agency” needs to be established before undertaking the plan implementation process (or local watershed groups established), and this would allow all local watershed groups understanding their strengths, predicting potential barriers, and analyzing future capacity building needs. Indeed, an evaluation of capacity is considered as a valuable process associated with new SWP plan implementation. A detailed capacity check list is recommended for local watershed groups to avoid future implementation delays.

6.3 Limitations and Future Research

Although this research has been successful to identify the capacity needs for implementing SWP plans in Saskatchewan, limitations have surfaced throughout the research process. The geographical scale of the province posed a challenge for collecting data from key informants. The inclusion of more watersheds would provide more perspectives to help corroborate these research findings. In total, 14 interviews were conducted for this research representing a limited portion of the population who are responsible for SWP plan implementation. A suggestion for future research would be to adapt a provincial questionnaire to conduct the interviews in all watersheds. Using all of the Saskatchewan watersheds with a completed SWP plan would have provided a comprehensive study to help draw general conclusions.

The goal of this research was to identify capacity building opportunities that would facilitate the implementation of SWP Plans in Saskatchewan. The main implication from this research is that local and watershed scale capacity factors need consideration for effective SWP plan implementation. There are capacity areas that need greater enhancement for SWP plans to be more effectively implemented in Saskatchewan.

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APPENDIX A: Interview Questions

Questions for Provincial organizations

- 1. Do you meet with the watershed coordinator regularly? How often? Is this enough?*
- 2. From the WSA/local watershed group perspective, is the implementation process going fast enough, or on target? If not, why?*
- 3. Is the budget for plan/project implementation increasing or decreasing?*
- 4. What actions/activities do you (or your organization) provide to watershed associations for implementing SWP plan?*
- 5. What do you feel are the barriers of plan implementation?*
- 6. What do you feel are the facilitating factors of SWP plan implementation?*
- 7. What would make SWP plan Implementation more effective? What is needed?*
- 8. What international and inter-provincial cooperation exist for plan/project implementation?*

Questions for Local watershed groups

Has this key action been implemented?

IF YES: What main factor facilitated the implementation of this key action ? Were there any other factors that helped facilitate implementation?

IF in PROGRESS: What factors are facilitating implementation? Factors are constraining implementation?

IF NO: What main factor is constraining the implementation of this key action? Are there other factors that constrain implementation? What is needed to help you to implement this key action? Is there hope this can happen?